

A. 1. d. Availability of Information. Williams et al. (1973) stated, "Bits of information on currents, salinities, temperatures, effects of storms, and other events (including engineering projects) are scattered widely in the literature, from historical narratives to modern scientific papers, but effective physical description of these bodies of water has seldom been accomplished." This 18-year-old statement about the Albemarle-Pamlico system is still generally true. Most of the existing data for the Albemarle-Pamlico estuarine system is, by virtue of the objectives and methods of the data collection, more suited for analysis of processes occurring under a particular set of circumstances than for use in the assessment of temporal and spatial trends. Bales and Nelson (1988) compiled a bibliography of works concerning hydrology and water quality in the Albemarle-Pamlico region, which is useful for identifying available data.

Freshwater inflows to the Albemarle and Pamlico sounds are gaged by the US Geological Survey (USGS). Ragland et al. (1987) summarized the existing USGS stream-gaging network in North Carolina, however, most of the gaging stations are located well upstream of the mouths of the Albemarle-Pamlico tributary rivers. Flow from about 63% of the 4,940 square-mile Roanoke River basin is measured; flow from only about one-half of the 4,300 square-mile Tar-Pamlico River basin and the 5,600 square-mile Neuse River basin is gaged. In addition a few of the smaller tributaries to the sounds are gaged, but in general, freshwater inflow rates to the Albemarle-Pamlico system are not well defined.

Based on frequency curves for annual mean discharge (Wilder et al. 1978) of the Blackwater, Roanoke, Tar, and Neuse Rivers, there is a 50% chance that annual mean flow in any year will be 0.8 cfs/sq mi or less in the Blackwater and Roanoke Rivers. The comparable flows for the Neuse and Tar Rivers, on the other hand, are about 1.05 cfs/sq mi. Low flow frequency values were similar for all streams except the Roanoke (Wilder et al. 1978). Natural flows in the Roanoke are augmented by releases from Kerr and Gaston Reservoirs. During 30-day, 10-year low flow conditions (flows which are not exceeded for 30 consecutive days and occur, on the average, once every 10 years) about 75% of the total inflow to the Albemarle-Pamlico estuarine system consists of flow from the Roanoke River basin, which constitutes only about 48% of the total Albemarle-Pamlico drainage basin.

Historical tidal-elevation records exist for numerous sites around the Albemarle-Pamlico estuarine region. A synoptic array of tidal-elevation gages was installed along the Pamlico and Neuse Rivers during February 1988 by the US Geological Survey (Figure III-1) and in Albemarle Sound in 1990. US Army Corps of Engineers' (COE) needs are typically project-specific and, as a consequence, COE gages tend to be short-duration installations. Short-duration historical records also exist from numerous National Ocean Service (NOS) gages in North Carolina. Chronologies of COE and NOS tidal-elevation stations are available. About 6 years of record for eight sites located on the Chowan River are also available for the late 1970s and early 1980s (Daniel 1977). In addition, tidal-elevation data, with periods of record on the order of months, have been obtained by other researchers, such as Pietrafesa et al. (1986). Useful publications for tidal information include the following tide tables published annually by the US Department of Commerce: NOS publications "Index of Tide Stations, United States of America and Miscellaneous Other Locations", "Sea Level Variations for the United States 1985-1980 (Annual Revision)", "Products and Services Handbook", Ho and Tracey (1975), Harris (1981) and Ebersole (1982).

By contrast, there have been relatively few measurements of tidal velocity in Albemarle-Pamlico estuarine waters. One potential difficulty with utilizing much of the available velocity data is that important ancillary information, such as tidal stage, salinity, and wind field, were not obtained in conjunction with velocity measurements. Several sets of velocity measurements have been taken at Oregon Inlet and Ocracoke Inlet (Giese et al. 1985). These COE data typically were taken at various times throughout a single tidal cycle. One set of velocity data was collected at Hatteras Inlet during flood flow.

Dye releases for the measurement of time of travel have been made in the Chowan River (Daniel 1977), the Neuse River (Woods 1969; Christian et al. 1986), and the Pamlico River (Horton et al. 1967).